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THE WEST POINT, TEXAS, SALT DOME FREESTONE COUNTY

E. DeGOLYER
65 Broadway, New York City, New York

INTRODUCTION

The West Point salt dome is a large, symmetrical structure of the salt-dome type occurring in the extreme southeastern corner of Freestone County, Texas. This dome structure is one of the most symmetrical and best defined, both geologically and topographically, of the North American salt domes, notwithstanding which it seems largely to have escaped the attention of geologists to the present time.

References to it in geologic literature are few and scant and no detailed description has yet been published. Deussen[1] referred to a dome in Freestone County as one of the inner belt of coastal domes, and Woodruff [2] first described the West Point dome generally, emphasizing particularly its fitness for study as a type example of salt-dome structure. Hopkins[3] included this dome, which he calls the Butler dome, on his index map showing the location of the Palestine dome, and Dumble[4] described it briefly under the same name.

The dome has been examined several times as a salt or petroleum prospect. Lee Hager reported upon it in 1908 and in his report mentions having examined it for private interests in 1907. Lewis C. Chapman reported on it in 1915 and various geologists of the

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[1] Alexander Deussen, "The Humble, Texas, Oil Field," *Southwestern Assn. Pet. Geol., Bull. 1* (1917), pp. 60–79.

[2] In discussion of Deussen's paper. *Southwestern Assn. Pet. Geol., Bull. 1* (1917), pp. 79–84.

[3] Oliver B. Hopkins, "The Palestine Salt Dome, Anderson County, Texas," *U. S. Geol. Survey, Bull. 661g* (1917).

[4] E. T. Dumble, "Origin of the Texas Domes," *Amer. Inst. Min. Eng., Bull. 138* (June, 1918), pp. 1629–36.

Roxana Petroleum Company made a very careful and detailed geologic and topographic map of the dome about the same time.

The writer visited the West Point dome in 1916 with Lewis C. Chapman. He was so struck by the symmetry of the dome, the clear manner in which its structure is revealed, and its peculiar and characteristic topography that he resolved to study it more closely at the first opportunity as a type of salt-dome structure. This opportunity presented itself in November, 1917, and some five days were spent in making a rapid plane-table sketch of the dome.

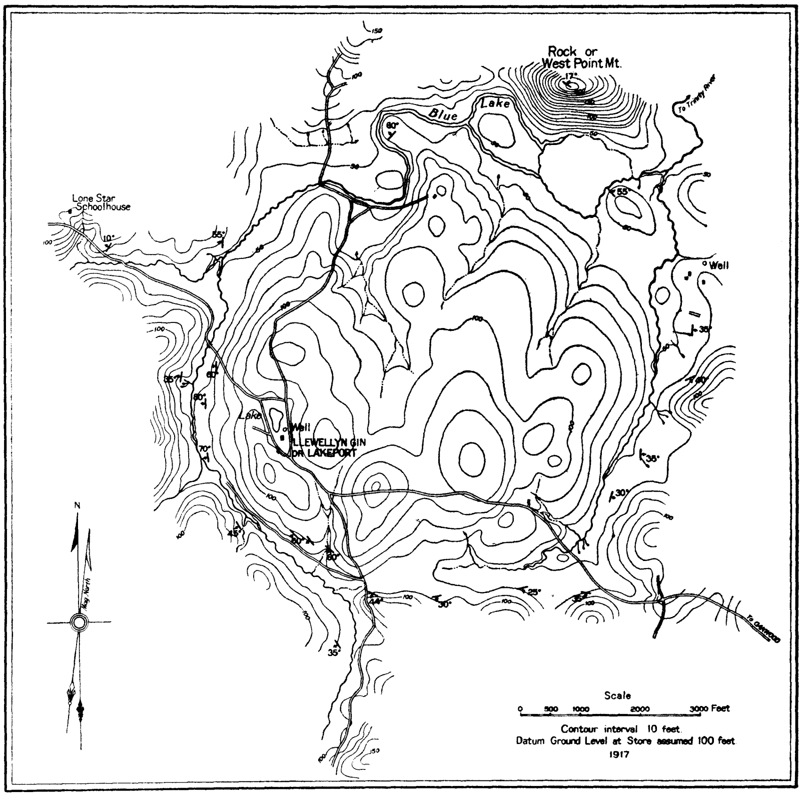
Rock or West Point Mt.
Blue Lake
To Trinity River
Lone Star Schoolhouse
Well
Lake
Well
LLEWELLYN GIN OR LAKEPORT
To Oakwood
N
Mag North
Scale
0 500 1000 2000 3000 Feet
Contour interval 10 feet.
Datum Ground Level at Store assumed 100 feet.
1917

FIG. 1.—Topographic and geologic map of the West Point salt dome, Freestone County, Texas.

The accompanying map (Fig. 1) is a result of this survey. Not enough time was available to make the detailed and extensive map which would better express fully the geology of the dome. Traverses were run along the principal roads, around the circular drainage, and across the mound.

An attempt was made to express the drainage exactly, the essential topography, and sufficient dips and strikes to outline the dome structure. Many dip and strike observations could have been made in addition to those recorded. No attempt was made to map all of the springs and water seepages. A complete map of the dome should express in greater detail the topography outside of the circular strike drainage.

The writer has withheld this map in the hope of being able to make further field studies, but as the opportunity for such work seems remote, he offers the map in its present form as a contribution to the geology of salt domes. Acknowledgment is due and gratefully rendered to Earle S. Porter for his assistance in mapping the dome, to Lewis C. Chapman for much information regarding the dome, and to Sidney Powers, whose sketch and notes regarding a part of the dome the writer has seen.

LOCATION

The West Point salt dome lies some five to seven miles north of the town of Oakwood on the International and Great Northern Railroad, and extends from a mile or two east of Butler post-office to the western edge of the flood plain of the Trinity River (Fig. 2).

It is the southernmost known dome of the interior group of salt domes and forms a triangle with the nearby Palestine dome, the center of which lies some 9 miles N. 51° E., and with the Keechi dome, the center of which lies some 14.7 miles N. 34° E. from the center of the West Point dome. The remaining known domes of the interior group in Texas are the Brooks dome, some 39 miles N. 34° E.; the Steen dome, some 69 miles N. 27° E.; and Grand Saline, some 74 miles N. 9° E.

It will be noticed that West Point, Keechi, and the Brooks dome lie on a straight line striking N. 34° E. The Palestine and Steen domes lie near this line. This line of strike is roughly parallel to that of the Balcones fault, which strikes N. 25–30° E., and is some 70 miles distant, as well as roughly parallel to the belts formed by the outcrop of various Tertiary formations to the westward.

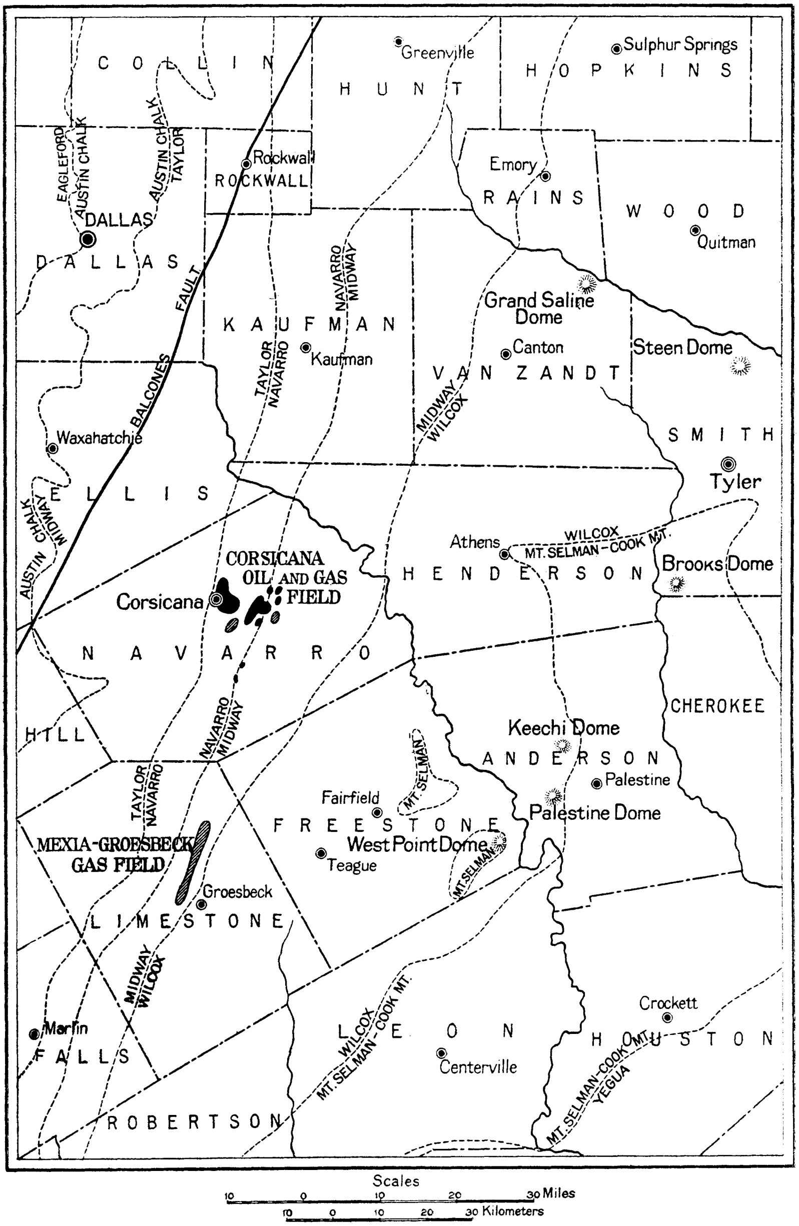

FIG. 2.—Index map showing location and relations of the West Point dome

This alignment and parallelism were recognized and mapped by Veatch[1] before he was aware of the existence of the Keechi and West Point domes.

Davis Hill, in Liberty County, some 110 miles S.SE., is the nearest of the known coastal salt domes, and the so-called Brenham dome is about the same distance S.SW.

The Batson and Saratoga fields, some 125 miles S.SE. from West Point, are the nearest proven oil fields with salt-dome structure. The nearest producing oil field of any type is the Powell pool of the Corsicana field, some 40 miles northwest, and the nearest producing gas field is the Mexia-Groesbeck field, some 37 miles due west of the West Point dome.

TOPOGRAPHY

Topographically, this dome consists essentially of an almost perfect circular mound surrounded by a ring-shaped valley, and this in turn is bounded on its outer margin by high hills having steep scarp faces toward the valley and long dip slopes away from it. This topography is so expressive that one would be justified in classifying this as a salt-dome structure on the basis of topographic evidence alone.

The mound forms in plane section an almost perfect circle 7,500 feet in diameter. The highest point is near its southern edge just opposite the divide between the two streams forming the ring-shaped encircling valley. The height of the mound here is sixty feet above that of the divide and one hundred feet above that of the junction of the two streams, the lowest point in the ring-shaped valley.

The mound is rather flat on top and dips steeply off to the valley on all sides, indicating that the erosion of the dome itself is not keeping pace with the cutting down of the valley. The erosion of this dome is developing regularly by means of channels and run-off normal to the major drainage, that of the ring-shaped valley. The longest draws or arroyos are those normal to the major drainage at its lowest point, and there seems to be no development of laterals paralleling the ring-shaped drainage. This may be the result of the steep gradient of the draws and the softness of the Wilcox formation which covers the top of the mound, but it may also indicate that the beds on the top of the dome are not dipping so steeply as around its perimeter and consequently there is no tendency for strike drainage to develop.

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[1] A. C. Veatch, "The Salines of North Louisiana," *Geol. Survey Louisiana, Report of 1902*, pp. 41–100.

The most striking feature of the topography is the comparatively broad ring-shaped valley which encircles the mound. This ring-shaped valley widens to a broad crescent-shaped area in its northeastern quadrant where the streams forming it come together and, passing through a gap just east of West Point Mountain, meander across the broad flood plain of the Trinity River to join it a short distance away.

The circular shape of this valley is due to the fact that streams forming have developed along the circular strike of the rocks around the salt dome or have been adjusted to it.

The principal stream is the one which comes into the dome at a point S.SE. of Llewellyn Gin, flows around its west and north sides through Blue Lake and, after being joined by the smaller eastern stream, flows off to Trinity River through the gap near West Point Mountain.

The fact that the direction of this stream where it comes into the dome is toward the West Point Mountain gap, by which it ultimately leaves it, suggests that it may previously have flowed directly across the dome and that it was adjusted to its present position by the formation of the dome.

The present drainage courses also suggest that this stream may have once flowed around the east side of the dome instead of the west side, as at present. The divide between the two streams is so low as to be almost imperceptible at the present time, and the direction of the draw just west of the road south from the Gin suggests that it was originally a tributary to the eastern drainage. If this suggested stream piracy actually occurred, it was probably effected by a tributary to the stream coming into the dome from south of the Lone Star schoolhouse and caused by more rapid erosion of the western channel resulting from the greater number of tributaries coming into it.

There is a gap, through which it is possible that the drainage once left this dome, about one-fourth of a mile south of the West Point Mountain gap.

The broadening of this valley into the crescent-shaped area already mentioned and the formation of Blue Lake and the imperfect drainage systems leading from it are evidently due to the drainage channels working down the dip toward the point of outlet and the fact that they have apparently reached the base-level of the Trinity River.

This ring-shaped valley, both in its narrow and broader courses, is a barren, open, prairie-like area covered with a sort of coarse marsh grass and is quite conspicuous because of its peculiar form and because of the vistas which it affords in this more or less wooded region.

Throughout the entire course of the valley, though occurring for the most part on its outer edge, are numerous springs and boggy places formed by the seeping of water. These springs are mostly of fresh water except for the salts leached from the formations from which they rise and which often forms incrustations of salt around the springs.

These springs are evidently formed by artesian water collected by the normally southeastward-dipping sands of the Wilcox formation over the large areas where it outcrops to the westward and coming to the surface here where the Wilcox is turned sharply upward around the edge of the salt core of the dome. The rarer brine and sulphurous water springs, some of which are found just south of West Point Mountain, doubtless rise from greater depths through faulting around the perimeter of the salt core.

Some of the brine springs near West Point have been worked intermittently for salt since before the Civil War.

These artesian springs bring up fine-grained sand and clay and thus form mounds, some examples of which are several feet across. Woodruff[1] cites the mounds formed along this ring-shaped valley, particularly on its north side, as excellent examples of the small mounds which are so typical of coastal-plain topography.

The outer circle of hills is generally higher than the inner mound and the hilly area extends off to the south and west in the dissected uplands formed by the rather extensive outlier of Mount Selman beds. To the northeast they extend but a short distance before the flood plain of the Trinity River is reached.

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[1] E. G. Woodruff, *op. cit.*

Though no investigation was made to determine whether or not there are more circular strike-drainage channels concentric to the valley mentioned in this hilly region, the writer strongly suspects that such drainge exists.

SURFACE GEOLOGY

The oldest rocks outcropping in the West Point dome are apparently the greenish-yellow clays and shales outcropping in the segment of the inner edge of the central mound lying between the road leading south from Llewellyn Gin and that leading from the Gin to the Lone Star schoolhouse. On a lithologic basis and guided by the apparent relation of these shales to the Wilcox formation, one would refer them to the Midway (Eocene) or Navarro-Taylor (Cretaceous) formations.

Sidney Powers has collected fossils from these shales or a horizon immediately above them at points respectively 1,000 feet NW.W. and 1,500 feet S.W. of Llewellyn Gin, and their age as published elsewhere[1] has been determined by Dr. C. Wythe Cook and Dr. L. W. Stephenson, of the United States Geological Survey, as Lower Eocene, either Midway or Wilcox and Upper Cretaceous.

On these bases the shales are assigned tentatively to the Midway Eocene and Navarro Upper Cretaceous. Dumble's[2] statement that this dome gives the same section as the Palestine salt dome, in which the outcrops of all of the formations of the Gulf series of the Cretaceous have been recognized, is clearly in error. The writer has seen no evidence of the outcrop, other than that just stated, of any Cretaceous rocks in this dome.

The center of the dome is covered with the very heavy sandy soil so characteristic of the Wilcox formation. Though not exhaustively searched, no outcrop of the country rock was seen except an imperfect outcrop of a heavy yellow sandstone in the road some 1,500 feet due north of the Gin. This sandstone apparently pertains to the Wilcox, and it is believed that the central part of the dome is underlain by the Wilcox formation except in the area mentioned as probable Midway and Cretaceous outcrop. Chapman notes that an inlier of the Mount Selman beds is to be found in the central part of the dome, but this was not seen by the writer and, if present, is believed not to be in place.

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[1] The writer is very much indebted to the kindness of Dr. Powers for permission to use, in the present paper, these fossil determinations which he is discussing in greater detail elsewhere.

[2] E. T. Dumble, *op. cit.*

All of the outcrops along the circular drainage valley which outlines the dome are of soft white, gray, and yellow sandstones and white, purple, and yellow shales of the Wilcox formation. Most of the dip and strike observations recorded were taken on bands of ironstone concretions in sandstones of this formation. The Wilcox formation also forms all of the lower hills and the base of the higher hills which form the outer edge of the circular drainage valley.

The upper part of the higher hills around the outer edge of the circular valley are composed of the characteristic ferruginous sandstones and conglomerates, in places iron ore, of the lower part of the Mount Selman beds, Claiborne, Eocene. The country rock for some miles to the west of this salt dome is of this same formation, though it apparently only caps the hills on the northeast. Hopkins[1] describes a section of the Wilcox in a bluff on the bank of the Trinity River at the mouth of Town Creek, some three miles northeast of the dome.

The dome lies at the easternmost point of a triangular-shaped outlier of Mount Selman beds. Another large irregular outlier of the same formation occurs in northeastern Freestone County. These outliers are cut off from the main body of Cook Mountain—Mount Selman formation, which lies to the eastward in Anderson County, by the broad valley of the Trinity River.

UNDERGROUND GEOLOGY

Some five wells, all comparatively shallow, have been drilled on or around the dome, but available information concerning them is scant and inexact; consequently we can do little but speculate regarding underground conditions. Lee Hager's report of July 7, 1908, on the Blue Lake oil field, states that some three wells had been drilled in the vicinity of Blue Lake up to that time.

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[1] Oliver B. Hopkins, *op. cit.*

The Oakwoods Oil Company is said to have drilled a well to a depth of 800 feet on the J. Strickland tract. A show of oil was reported. Two wells were drilled by the Gum Springs Oil Company, the first reaching a depth of some 1,220 feet and the second a depth of some 600 feet. All of these wells were drilled before 1908 and all of them were drilled in the vicinity of Blue Lake and West Point Mountain. None of them report salt.

At a later date at least two wells were drilled on the southwest side of the dome, one just north of Llewellyn Gin and the other just west of it. No detailed information regarding these wells was obtained. According to local report, the well north of the Gin, where casing still protrudes from the ground, was drilled to a depth of 700 feet and was drilling in rock salt when abandoned. The salt is said to have been struck at a depth of 300 feet.

The only log of any of these wells which is available to the writer is that of No. 1 well of the Gum Springs Oil Company, the deepest of the reported wells. According to Hager, this well was drilled on the east side of the "saline," a name which he gives to the wide valley just south of West Point Mountain. This well was evidently down on the flank of the dome. The log is quoted after Hager's report as follows:

Formation	Thickness in Feet	Depth in Feet
Soil	10	10
White running into dark sand	15	25
Soft slate and lignite	20	45
Alternating hard and soft shaly slate	46	91
Soft very black lignite	45	136
Brown sandy shale	27	163
Blue artesian water sand	71	234
Blue sandy rock	2	236
Brown shale	24	260
Alternating stratas soft coal, brown shale, and crystals of sulphur or paraffins	11	271
Black shale, blue sand with continuous particles of yellow honeycomb rock and strong gas and oil showings	39	310
Black shale	25	335
Black and brown shale, some sand, and pyrites	43	378

Formation	Thickness in Feet	Depth in Feet
Soft coal, brown shale, and pyrites	34	412
Brown shale and bowlders	29	441
Brown shale	25	466
Brown shale, gravel, and pyrites	18	484
Soft rock	2	486
Brown shale, considerable blue sand, and pyrites	31	517
(Missing)	...	....
Brown shale	3	555
Blue concreted sand bearing gas and strong sulphur water	5	560
Alternating dark brown shale, deep blue concreted sand, and considerable pyrites, here passed through 4 inches very hard pale rock, color of limestone, but upon test shows not to be limestone	16	576
Blue concreted sand	10	586
Dark brown gumbo with some black shale and pyrites	19	605
Dark blue gumbo	10	615
Blue sand, shale	2	617
Blue sand gumbo	13	630
Black, very hard shale	25	655
Very hard blue laminated rock	2½″	....
Blue sand and black shale	3	658
Very hard rock	3	661
Alternating stratas of black gumbo shale with concreted blue sand and numerous iron pyrite bowlders but no rock stratum	559	1,220

Artesian water flowing out of the well was encountered at 163 feet, and oil and gas were encountered from 271 to 319 feet. The gas is said to have had a sweet and pungent odor and to have burned with a blue flame.

Apparently at least the first 400 feet of this log represents the Wilcox formation. Below 400 feet the formations are possibly Wilcox and Midway for 200 to 250 feet, and the remainder of the log represents the Navarro formations.

Aside from the very scant information obtained from the wells, we can only argue by comparison and inference regarding underground conditions.

At the nearby Palestine dome the Midway is believed to be absent, but all of the various formations of the Gulf series of the Cretaceous outcrop in the center of the dome. No continuous section is exposed and consequently the thickness of the various formations cannot be determined.

At the Keechi dome the oldest outcropping formation is the Austin chalk, and the Midway is said to be absent by unconformity. The Texas Company has drilled five wells on the southeast flank of the dome to depths of 3,170, 2,297, 2,656, 2,454, and 3,048 feet respectively. These wells start in the Wilcox, some of them penetrate the Woodbine, and possibly the first well passed through the Woodbine. It is almost impossible to estimate the thickness of the varous formations from the log of these wells.

Near Freestone, about 22 miles S.SE. of the West Point dome, a well was drilled by the Freestone Syndicate, Inc., to a depth of 2,370 feet. This well started in the lower Wilcox or Midway and was evidently in the Eagle Ford when abandoned. The log of this well, according to Lewis C. Chapman, who had the drilling under observation and supervised the collection of samples, was as follows:

Well No. 1, R. A. Tacker

	Thickness	Depth
Wilcox formation	624	624
Midway formation	177	801
Navarro and Taylor formations	820	1,621
Austin chalk	529	2,150
Eagleford shales	220	2,370

This determination is based altogether on lithologic characteristics and is probably exact only for the Austin chalk. The Nacatoch sand member of the Navarro formation is believed to have been passed through from 1,196 to 1,215 feet.

The most exact information regarding the thickness of the various formations in this general region is the section given by Matson[1] and based chiefly on the log of a Magnolia Refining Company well at Corsicana, some 50 miles northwest of the West Point dome. The various formation thicknesses given by him are as follows:

Navarro formation	1,650 feet	2,135 feet
Navarro and Taylor formations	135 feet	
Taylor formation	350 feet	
Austin chalk	425 feet	
Eagleford clay	370 feet	
Woodbine sand	400 feet plus	

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[1] G. C. Matson, "Gas Prospects South and Southeast of Dallas," *U.S. Geol. Survey, Bull. 629* (1916), pp. 77–119.

Below the Gulf series of the Upper Cretaceous come the Washita, Fredericksburg, and Trinity groups of the Comanchean, but it would probably require a well more than 3,500 feet deep to reach the uppermost of these formations on the West Point dome.

There is no information regarding the dome material, the salt, gypsums, or limestones of secondary origin, other than the report that rock salt was found at a depth of 300 feet and penetrated to a depth of some 700 feet in the well drilled at Llewellyn Gin. It is not known whether or not there is a cap rock present over the salt.

Structurally this dome is very symmetrical, as is indicated by the dip of the outcropping formations. From one's general knowledge of salt-dome structure he would suspect that the upper part of the salt mass, the intrusion of which gives rise to this structure, has the form of a very regular truncated cone. The very steep dips and outcrop of the older shale (Midway?) formation southwest of Llewellyn Gin indicate that the southwestern edge of the dome is the point of greatest upthrust and consequently the point where the salt lies at the shallowest depth from the surface. The upthrust in this dome has been 800 to 1,000 feet.

The rocks over the top of the salt mass are probably level-lying or nearly so. Around the perimeter the dips are very high, 25°–80°, and away from the center of the dome. They decrease rapidly as one goes away from the dome.

Only the central part of the area affected by the uplift of this dome is shown on the attached map. The entire uplift doubtless has a diameter of 3 to 4 miles and an area of 7 to 12 square miles.

AGE OF DOME FORMATION

The Mount Selman beds of lowest Claiborne (Eocene) age, and the youngest rocks outcropping in this immediate region, dip away from the West Point dome in all directions. Since these beds were involved in the folding which resulted from the formation of this dome, it is evident that the intrusion of the salt mass was not completed before early Claiborne time and the entire process may have occurred at some period since then and down to quite recent time. In fact, the formation of this and similar domes may be a very slow and continuous process now going on.

The West Point dome is a geologic phenomenon so similar to the other interior domes, particularly the nearby Palestine and Keechi domes, that it is undoubtedly of similar origin and probably contemporaneous in formation with them. Deussen[1] argues that these domes "were clearly formed in late Cretaceous or early Tertiary time, as is evidenced very clearly in the case of the Keechi dome of Anderson County, where the Wilcox beds of the Eocene rest unconformably on the Navarro beds of upper Cretaceous, the Midway being absent." He further states that the high angle of dip of the Wilcox around these domes, in conjunction with the unconformity, is plain evidence that the growth of the salt core is the result of different movements at different times.

Hopkins[2] accepts, for the Palestine and Keechi domes, Deussen's theory of the initial uplift of the dome during pre-Midway time and the existence of the domes as islands in the Midway sea. This theory is of course proposed to explain the apparent absence of the Midway formations at both the Palestine and Keechi domes.

This theory is not tenable for the West Point dome, if, as has been suggested, part of the greenish-yellow shales which outcrop west of the Llewellyn Gin are of Midway age. Neither is the theory the only available one, nor, in the writer's opinion, the most satisfactory one, to account for the apparent absence of Midway outcrops at the other domes.

The country rock is very poorly exposed at the Keechi dome and not much better exposed in the Palestine dome. It is entirely possible that a formation composed chiefly of shale and only a few hundred feet thick, as is the Midway, and occurring in a structure where the rocks are dipping very steeply, may not be well exposed or may have been overlooked.

If the Midway is absent in the Keechi and Palestine domes, however, the writer would suggest that it may have been faulted out of the outcropping section by having an older formation, say the Navarro, punched through it from below, and into contact with a still younger formation, say the Wilcox, by the upthrust of the salt core.

[1] Alexander Deussen, *op. cit.*

[2] Oliver B. Hopkins, *op. cit.*

This very peculiar type of structure is common in the Roumanian salt domes, where it has been studied by Mrazec,[1] who has designated the salt-dome structure with intruded and faulted core—his *noyau de percement* or core piercement structure—as "diaper" structure. Deussen[2] describes this very type of "piercement" structure in the Humble field where he regards the "Black Shale" Yegua as having been punched upward through the overlying Catahoula-Fayette sandstone series.

It is the writer's opinion that these domes were formed during very late time. The youngest formations outcropping near the domes have been involved in the deformation resulting from the intrusion or formation of the salt plug in every instance. The extreme youth of most known salt domes is, to the writer, a most significant fact. Sediments of Quaternary, perhaps of recent age, have been involved in the formation of the salt domes of coastal Texas and Louisiana. Pleistocene sediments were markedly folded by the formation of the Mexican salt domes. The mother-formation from which the salt of the Roumanian and Transylvanian domes is supposed to have been derived is of Miocene age and many of the German salt domes pierce Tertiary strata.

All of this points to the extreme youth of salt domes. It is doubtful whether a salt dome whose formation can be established beyond doubt as having occurred in pre-Tertiary time can be cited. This suggests that salt domes are, as the geologic time-scale goes, only transient affairs, and consequently theories of origin implying long life or great age for a dome should be looked upon with suspicion.

OIL AND GAS POSSIBILITIES

The West Point salt dome is believed to be a structure of type suitable for the accumulation of oil and gas deposits in commercial quantities. The upthrust here is not so great as at the Palestine and Keechi domes and it seems probable that the sedimentary formations are less faulted and broken than at those domes. This condition favors the West Point dome.

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[1] L. Mrazec, "Les Plis a noyaux de percement," *Bull. Soc. Sci. Bucarest,* 1906: *Monit. due Petrole Roumain,* X (1908), 915–16.

[2] Alexander Deussen, *op. cit.*

The series of rocks forming this structure include known petroliferous or gas-bearing formations as follows: the Navarro formation, Nacatoch sand, is gas-bearing in the Mexia-Groesbeck and Corsicana fields and oil-bearing in the northwestern Louisiana; the Taylor marl includes the oil-bearing formation at Corsicana; the Austin chalk is oil-bearing in the small fields near San Antonio; the Eagleford contains the gas-bearing Blossom sand member of northwestern Louisiana; and the Woodbine sands include oil-bearing formations in northwestern Louisiana.

A test well 3,500 feet deep on the upper part of the flank of the West Point dome should pass through this entire section of rocks.

The direct indications of the existence of oil or gas deposits in this dome consist of the gas and oil shows reported in various wells drilled around this dome, as already stated, and gas seeps and sulphurous water springs near West Point Mountain which have been reported by Chapman and Hager. No search for direct indications was made by the writer, and he is therefore unable to confirm their existence.

None of the salt domes of Texas or Louisiana have yielded gas deposits of marked commercial importance, though many of them have been the source of exceedingly rich oil deposits. None of the interior domes have yet yielded commercial oil production. Some heavy oil (8° Be.) was found in the Woodbine sands on the flank of the Keechi dome in the Texas Company's well No. 1 Barret and Greenwood.

Petroleum in commercial quantities in salt-dome structures of the Gulf coastal plain has as yet been found to occur only under one of the four following conditions: first, in the cavernous limestone and gypsum cap immediately overlying the top of the salt mass, the so-called "cap rock"; secondly, in sands pierced by the salt, abutting against and sealed by the salt, and dipping away from it, the so-called "lateral sands" or "deep sands"; thirdly, in sands or sandstones for the most part lenticular and occurring above the cap rock or the salt dome itself, the so-called "shallow sands" in the Humble, Batson, Spindletop, and other fields or the deep sands in the so-called "deeply buried domes" such as Goose Creek and Edgerly; and fourthly, in sand lenses and shales on the sides of the dome.

By far the most important of these are the first and second types of occurrence. The fourth type of occurrence might well be included in the same class with the second type except at Humble, where they are quite distinct. The third type of occurrence is much more important than generally recognized and is generally confused with the "cap rock" or the first type of occurrence. Spindletop is a fair example of a field where all of the production, until quite recently, has been supposed to come from the cap rock but where, in fact, much of it has come from shallow sands above the cap rock.

In view of the results obtained in the well north of Llewellyn Gin, which was drilled to the salt without any oil or gas production, and particularly because of the shallow depth at which the salt was encountered, prospects for cap-rock or shallow-sand production on the West Point dome would seem to be very poor. This single well is not a sufficient test of these possibilities, but the shallow depth of the salt is an unfavorable condition.

The possibility of finding oil and gas in the Cretaceous rocks on the flank of the dome has hardly been touched and would seem to justify the drilling of several deep wells. The most attractive area is a circular strip extending around this dome and from the base of the central topographic mound to about a half mile from it.

In view of the failure of the wells of the Texas Company on the flank of the Keechi dome, oil prospectors do not regard the interior domes with much favor at the present time, but these Keechi tests prove nothing but the barrenness of the limited area on which they were drilled. Many salt domes of the coastal group had been prospected intermittently for years before production was found. This is true of West Columbia and Goose Creek, the two most important fields of the Gulf coastal plain today.

The West Point dome shows every surface evidence of being a possible container of oil and gas deposits and should be prospected.